Formation of Language.

SEVERAL years ago, being interested in speculations on the development of language, and having a son a few months old, I instituted a series of minute observations on the part of the entire family as to his utterances. The result, curious at the time, has received a new interest from a later observation. The nursery maid who had charge of the boy did not understand a word of English, Italian being the language spoken with the domestics exclusively. The first articulations of the child were evidently meaningless mimicry of what he heard from us, and it had so much the character of English speech that the maid supposed he was speaking English. There was no attempt to catch or repeat any word—only a gabble, a gibberish, in which we were not able to detect any resemblance to any word of any language. This continued for several weeks, when we perceived that he began to repeat certain sounds to which we found that he attached definite meaning, and as this progressed he left off his incoherent imitation of our language, and he soon had coined a small vocabulary for himself, comprising words for bread, water, milk, &c. The first word we distinguished was as nearly as I can render it "bhumbhoo," meaning water. This phase continued some weeks also, when he began to couple our words for his objects with his own—as "bumbhoo-aqua," when he wanted water. Little by little he dropped his own words and began speaking only Italian. The three stages of the development of language were perfectly distinguishable, but I supposed that the words the child contrived were purely arbitrary, and am inclined to think so still; but during a late visit to Greece I went over to Crete, and visiting in the family of an old Cretan friend, I was interested in a little boy—his young son—who was in the state of development of speech which I have noted in ours as the second. He had only got two or three words, but that for water was precisely the same as that which my own little boy had invented. Have any of your readers who have the watching of child-talk made any analogous observations?

Rome, March 15. W. J. STILLMAN.

Force and Determinism.

IN case any philosophers who do not happen to be physicists feel a doubt about the orthodoxy of what I understand to be one of the main doctrines in Dr. James Croll's recent book, reviewed in your issue of March 12 (p. 435), viz. that although expenditure of energy is needed to increase the speed of matter, none is needed to alter its direction (and the doubt has been already expressed to me); perhaps it will not be regarded as intrusive if I say that this statement is perfectly correct.

Determining the direction of motion involves no expenditure of energy or performance of work. Energy may be guided along desired channels without altering its quantity in the least—just as can matter. The rails which guide a train do not propel it, nor do they necessarily retard it; they have no essential effect upon its energy except a guiding effect. A force at right angles to motion does no work.

It is a function of living organisms thus to direct the path of transference of energy, but they add nothing to its quantity. There is no more energy in a live animal than in a dead one—in a lighted fire than in one ready to be lit. There is activity of transference and transformation in the one case, and stagnation in the other; but the law of conservation has nothing whatever to say against a live animal, or a mind, controlling the motion of molecules; although it would have everything to say against motion being produced *de novo* by an act of will. Life is not energy, it is a determiner of the paths of energy. That is its natural and principal function: it is a director, not a worker. Food and fuel work: life directs. It has control over triggers and sluice-gates. It is not the main-spring of the clock, it is the touch which sets it going. Its best analogue is flame: life is the spark which ignites a conflagration.

The distinction between generating motion and directing motion is evidently one useful to remember. If anyone has thought that an arbitrary alteration of, say, the weather, would necessarily involve a contradiction of the principle of conservation of energy, I think I am right in saying that he has been mistaken.

OLIVER J. LODGE.

Modern Views of Electricity.

MR. BURBURY asks for an explanation of the permanence of the atomic charges in air films, but this carries the question further than I can follow it.

My suggestion is simply that the chemical attraction of zinc for oxygen is necessarily accompanied by + electricity on the zinc and – on the oxygen. The permanence of the charge is, on this view, bound up with the permanence of chemical affinity. It is perhaps only completely to be explained by a knowledge of the mechanism of the latter; and that is one of those "ultimate problems" which I was careful to avoid in my letter.

I fancy, however, that Mr. Burbury has not quite followed me in one point. There is to be no actual combination of zinc with oxygen—only a tendency thereto; and it is to this tendency that the polarized condition of the molecular chain is due.

University College, Bristol. A. P. CHATTOCK.

CHEMICAL SOCIETY'S JUBILEE.

WE have already given the address of the President, Dr. W. J. Russell, at the afternoon meeting. Sir Lyon Playfair and Sir William Grove, two of the five remaining original Fellows of the Society, at the same meeting recited their recollections of the state of chemistry at the time of the foundation of the Society, and we now reproduce their speeches, as they forcibly serve—that of Sir Lyon Playfair in particular—to bring home to us the great changes which have taken place during the fifty years.

At the dinner at the Hôtel Métropole on the Wednesday evening, the Marquis of Salisbury delivered a speech remarkable for the emphasis which he laid on the importance of the work done by the Society in cultivating the higher study of chemistry rather than its industrial applications, and it is noteworthy that Sir William Grove had on the previous day expressed his preference for the abstract rather than the applied side of the science. Such a consensus of opinion is most significant and hopeful. Sir Lyon Playfair, in responding to the Marquis of Salisbury's speech, showed that he was fully aware of the latest discoveries, and able to appreciate their high theoretic import.

At the afternoon meeting Sir Lyon Playfair said:—

It is a sad feeling that there are now living among us only five of the original founders of the Chemical Society. I am one of those five, and have therefore been selected to address a few words to you to-day. You have learned from the excellent discourse of our President that before 1841 chemistry was being both rapidly developed and rapidly evolved. New methods of research were being created; organic chemistry had almost been created. There were many luminaries in the chemical firmament all over the world at that time, and if I mention a few names they will appear to many of you as milestones representing mere discoveries and progress, though they are names well known to the older members of the Society and the few founders who are left as strong personalities with whom we connect much kindness, hospitality, and encouragement. Liebig was then *facile princeps* chemist of the world. He formed a school, and showed how to advance chemistry by original research. At that time, in 1841, the year of our foundation, his brilliant pupil Hofmann had scarcely risen above the horizon. Kopp and Bunsen had made researches, but were still young. There were in Germany names of the highest importance in our science: at Göttingen there was Wöhler, the dear friend of Liebig, and associated with him in his work; in Berlin there was Mitscherlich, the aristocrat of chemistry; there was Rose, the most lovable of our fraternity, who had raised analysis to a high platform by improving methods of research; there was Dove, the jolliest of companions, who had joined physics to chemistry; and lastly, there was Rammelsberg, who took mineralogy out of the domain of physics, and made it part of the domain of chemistry. In France, at that time—I speak only of those whom I personally knew, and whose friendship has ever been valuable to me—there was a man who died only the other day, but who was a veteran then, and famous for his researches on the fatty bodies, Chevreul; there was Balard, the discoverer of bromine; there was

Baron Thenard, the king among lecturers; there was Dumas the eloquent, who established the doctrine of substitutions; and there were other good workers who had not yet acquired the reputations which they afterwards gained —men like Pelouze, Fremy, and Regnault. These were the great luminaries on the Continent; but whom had we at home? There was my old teacher, and to all old chemists devoted friend, Graham, who founded one of the first laboratories of research which existed in this country; who by his profound philosophical views did so much to promote the advancement of chemistry. There was, at Manchester, Dalton, who did as much for chemistry as Kepler did for astronomy. There was Faraday, that prince of electricians; and my dear friend Grove, who now sits beside me, who formulated the correlation of forces; and Joule, who discovered the mechanical equivalent of heat. These names show that the great science of chemistry was active in our country. But it required association to bring the chemists together; it required association to encourage young men in research, and to give them that support which united science always adds to the promotion of investigation. Fifty years, gentlemen, is a long time in the history of an individual, but it is a mere mathematical point in the history of a science. We are sometimes told that chemistry is a modern science: that is not true. The moment that men's minds began to experiment on the constitution of matter, there was a science of chemistry. Tubal Cain was a chemist because he was skilled in brass and iron. Thales was a chemist when he declared that everything was made of water. Anaximines was equally a chemist when he said that everything was made of air. Aristotle was a very advanced chemist when he got out four elements—fire, air, earth, and water. So chemistry has progressed from those days to the present time by the investigation of the laws which govern the combination of the elements, and by examining into the constitution of matter. Now, chemists and microscopists have often been taunted with the fact that they are content to rely on those small particles of matter which we call atoms, and that they are narrow as men of science compared with astronomers, who sweep the skies and examine the motions of large masses of matter. But the astronomers have been obliged to take us into partnership. We have helped them to know the constitution of the stars, and we are now helping them to discover how new worlds are formed. It is unnecessary for me to detain you longer upon the subject of the progress of chemistry; for that has been ably done by the President. But I would like to hold out some encouragement with regard to the future of chemistry. There are periods of great activity in the progress of every science, and that has been manifested during the period terminating in our jubilee. When this Society meets to celebrate its centenary, what a different chemistry it is likely to be from the chemistry of to-day! Already analysis has led to synthesis, yet we know very little with regard to the processes that go on in organic bodies. With regard to the elements, we are beginning to doubt what they are, and even to hope for their resolution. When we find such an important law as the one that the properties of the elements are periodic functions of their atomic weights, what a field is thrown open for investigation! It is a field of discovery the borders of which we have scarcely yet crossed. The motions of the elements may ultimately be known to us, and even the ultimate elements themselves. We call them elements still, because they have a certain fixity, and we are at present unable to decompose them. But recollect that sometimes there comes a man who changes the whole features of a science. What did Newton do for astronomy? With one fell swoop he cleared away the vortices of Descartes, and the tremendous system of "monads," "sufficient reason," and "pre-established harmony" of Leibnitz, by his philosophy; and we may hope that during the next fifty years there will arise a chemical Newton, who will enable us to know far more than we now know, who may bring under one general law the motions of atoms, and even the rupture of those which we now call elements simply because they have acquired a fixity in the order of things and are able to resist changes in the struggle for existence. Let us have hope in the future. Veterans like myself and my friend Grove will not live to see these great discoveries, but some of our younger men will participate in the chemistry of the future, and will look back with interest to the chemistry of the fifty years we are now celebrating. There is no heart here so cold as to doubt the rapid and continuous progress of our science. I express my own thought, and I believe that I express the conviction of each person present, when I conclude in the words of Tennyson:—

"And men through novel spheres of thought
Still moving after truth long sought,
Will learn new things when I am not.

Thou hast not gained a real height,
Nor art thou nearer to the light,
Because the scale is infinite."

Sir W. R. Grove spoke as follows:—

My qualification for being here this afternoon is not one of great distinction. It is that of old age, and the privileges of old age are such as nobody envies. With old age come impaired faculties, and one of its effects is loss of memory. When I promised to take part in this celebration I thought that I should have some reminiscences of my early connection with it to bring before you; but when I came to look up the subject I found that my recollections of it were but slender. So that although, as I have said, my main qualification is that of old age—a sort of survival of the unfittest—I am afraid that I shall not be able to assist you very much. Still I do remember some few incidents of the early formation of the Society. I do not remember who was the actual initiator of it; but the most active man in its formation was undoubtedly Prof. Graham. There was a good deal of discussion as to who should be the first President of the Society. We were anxious to get a man of considerable distinction; and I spoke to Faraday. But he thought that he could do more good in research than in assisting in the construction of such a body; and so he declined the honour. Then the matter gradually advanced, until we got the names which appear in the charter of the Society as its original members. Among those names the only ones that I can now recognize are those of my old and good friend Sir Lyon Playfair, Prof. Graham, and my own. After considerable discussion it was agreed that Prof. Graham should be invited to become President, and he accepted I think that Mr. Phillips's name was previously suggested, but he declined, and proposed Prof. Graham. However, among the names I do not recognize more than those I have mentioned. I am surprised not to see one name among them. Perhaps he was then too young; but he afterwards took an active part in the Society. I refer to Jacob Bell, a very able, gentlemanly, and agreeable man, and also a good chemist. He was the means of introducing into this country the system of selling pure drugs. I could wish that my memory enabled me to tell you more about the origin of the Society; but I do not know that I can give you much information. There were of course discussions among the best chemists of the day. The name of Dalton has been mentioned by our President. I was present at the lecture which Dalton gave at the Royal Institution upon the atomic theory. He was then somewhat aged, of great simplicity of character, and thoroughly devoted to his subject. I well recollect the paper, and his drawings of atoms—little circles to represent atoms as minute spheres grouped together to show their action in uniting to form a molecule of a body. Illustrations were given of the combinations of nitrogen and oxygen, the spheres being arranged in symmetrical little groups around one central sphere. The most compact forms consisted of six spheres around one, for in that case they all touch, and thus pressed together give us a hexagon, as shown in the honeycomb, to the explanation of which a great deal of mathematics has been devoted. I have no doubt that it is caused by the pressure of the bees in crowding into the honeycomb; for each bee with closed wings being cylindrical or nearly so, and somewhat elastic, they convert the spherical cylinders which they make into hexagons by mutual pressure. Conversely you will find that pressure from without acts in the same way, as by winding a band round a bundle of soft clay tubes and gradually tightening it the tubes become hexagons. I think the name atomic theory was an unfortunate one. We talk fluently about atoms as the smallest particles that exist, and chemists regard them as indivisible in the sense of being so hard as to be incapable of further division. To my mind the infinitely small is as incomprehensible as the infinitely great. I use the word incomprehensible advisedly. I do not say that you may not believe in the infinity of the universe; but we cannot comprehend it, we cannot take it in. And so with the atom. Therefore I think that it would have been better to have taken a different word—say minim—which would have been a safer term than atom. As it is, different people think differently as to what an atom really is. However, that was Dalton's theory, deduced from the definite proportions of combining bodies, which is now universally regarded as the keystone of the constitution of matter enabling us to comprehend its combination into definite masses. After the elaborate survey you have just heard from our President, I will not attempt anything approaching to a summary of the chemical discoveries made during the lifetime of the Society; the more so as you can get them in the *Standard* of this morning, or at any rate a very large number of them. There are two ways of regarding science: first, as seeking natural revelations; secondly, practically, as applied to the arts and industries. For my own part, I must say that science to me generally ceases to be interesting as it becomes useful. Englishmen have a great liking for the practical power of science. I like it as a means of extending our knowledge beyond its ordinary grasp, leading us to know more of the mysteries of the universe. The little we can see of it even telescopically is a mere nothing, while what we call an atom is gigantic if its divisibility is infinite.

The spectroscope has been discovered during the lifetime of our Society; and I ought to have been its discoverer. I had observed that there were different lines exhibited in the spectra of different metals when ignited in the voltaic arc; and if I had had any reasonable amount of wit I ought to have seen the converse, viz., that by ignition different bodies show in their spectral lines the materials of which they are formed. If that thought had occured to my mind, I should have discovered the spectroscope before Kirchoff; but it didn't. I cannot recall to my mind any further points sufficiently interesting to speak to you about. Alphonse of Castile is reported to have said that if he had had the making of the universe he would have done it much better. And I think so too. Instead of making a man go through the degradation of faculties and death, he should continually improve with age, and then be translated from this world to a superior planet, where he should begin life with the knowledge gained here, and so on. That would be to my mind, as an old man, a more satisfactory way of conducting affairs. However, it is not so, and we must put up with things as they are. I have been sometimes reproached for having to a great extent given up science for my profession. I need not say that I should have preferred the former. But the necessities of a then large family gradually forced me to follow a more lucrative pursuit. I have said that I prefer contemplative science to science applied to the arts; we are overdone with artificial wants, and life becomes in consequence a constant embarrassment. But there is one practical problem which I would venture to urge upon the attention of the members of this Society: and that is that they should endeavour to prevent the existence of London fogs, even under a constitutional and representative Government.

At the dinner, the Marquis of Salisbury, in proposing "Prosperity to the Chemical Society," coupled with the name of the Right Hon. Sir Lyon Playfair, said:—

I have been, though most unworthy, selected to propose this toast. In vain I pleaded that it would be better in the hands of somebody who knew something about the subject, for those to whom I pleaded were hard-hearted and would hear no excuse. I must therefore proceed, hoping that my distinguished friend who sits next me [Sir Lyon Playfair] will supply that element of knowledge which, perhaps, you will find missing on the present occasion. What naturally strikes me is the importance—the enormous importance—of the science which you cultivate, to the community as a whole. Some hundred years ago, the President of a celebrated tribunal, who was a man of rather advanced opinions, informed Lavoisier that a Republic had no need of chemists. But though a man of advanced opinions he was behind his age. It was the beginning of a time when chemistry more and more as each decade rolled by asserted its vital importance to every class and every interest of every community in the world. I thought—if it is possible to pass any criticism upon the learned and able and most interesting discourse to which we have just listened—I thought that our President was a little too apologetic for chemistry in the early part of the century. Annals which contain the names of Davy and Faraday have no reason to be ashamed. But from my point of view—from the social point of view—chemistry undoubtedly has this claim, that it is one of the most powerful agents that has moved the world. But that is common-place. There is no need for me to tell you what Roger Bacon and Volta have done in the history of the world. But it seems to me that as an educational instrument upon the minds of the community it is one of the most valuable that we possess, because more than any other science it is brought into close communion with pure, real fact. Science is a word that is elastic; and in our days we hear many definitions of it. We hear something of the scientific imagination, a most valuable quality, which I would be the last to depreciate; only I think that, like many valuable concentrated essences, it ought to be indulged in only in small quantities. When there is a proportion in its admixture similar to that which Falstaff observed in his mixture of bread and sack, you feel a desire for more of the solid nutriment and less of the stimulating spirit. But chemistry has an enormous deal of bread and very little sack; it has a large amount of solid fact, and comparatively little of scientific imagination. For the chemist can always be certain of his discoveries; all he has to do is to repeat the experiment, and there is no doubt of his discovery. But when a man discovers what happened fifty millions of years ago, it is not easy to ascertain the exact accuracy of his discovery; and when he discovers all that is going on fifty billions of miles from us, although there may be much probability in what he teaches, still its certainty is not the same in character with the certainty of the man who can go back to his laboratory and repeat the experiment which he has made. I should say that astronomy is largely composed of the science of things as they probably are; geology consists mainly of the science of things as they probably were a long time ago; but chemistry is the science of things as they actually are at the present time. Now the application of a science of that kind to the national mind by constant familiarity with its teachings, by constant knowledge of its achievements, is of the highest human value. It teaches the mind the immortal difference between guessing and knowing. And the farther chemistry goes on, and the more it asserts the superiority of its ways and canons in all departments of human thought, so far shall we drive guessing to a distance and be satisfied with nothing but what we can know. But my task is to say something about the Chemical Society, and perhaps the most suitable course I can pursue, following the Chairman, is to take the other side from what he took, because that will at least give variety to our proceedings, and will also give you an opportunity of testing the superior value of his remarks. Now he dilated much, and most fitly and justly, upon the enormous value from a material point of view which chemistry has been to society in the rapid development which has marked the present reign. I am far from disputing its splendid services to the people of all Europe during that period. But I do not think that it is for the purpose of securing those services that this Society exists. My Right Honourable friend Sir Lyon Playfair did quite right to go to Manchester and stir them up there and teach them their business, and he was a benefactor of mankind in doing so. But when that impulse had been given, you may trust the self-interest of mankind to be sure that the material interests of chemistry will not suffer in the race. But there are other aspects of chemistry, higher aspects, which it is the function of a Society such as this to protect. It is your duty to keep up its intellectual spirit, to teach that not only those things which are demanded by the interests and industries of this country shall be cultivated, but those things also which carry us nearer to the essences of truth. I am not going to carry that pretension too high. We are beings of a mixed character, and our pursuits must bear a trace of the mixture which we give to them. I am not going to imitate the Oxford Professor of my youth, who said that the one thing he valued in the system of quaternions was the certainty that it could never be defiled by any utilitarian application. But still you will observe that the industrial part of chemistry has been that which has received the highest development. Our distinguished President gave us a touching and pathetic history of what I may call the loves and the vicissitudes of benzene. But why is benzene so famous? Why is she lifted up among so many of her compeers who appear in the chemical lists with formulas as imposing and with histories quite as difficult to follow? It is because the products drawn from benzene, or at least from coal-tar, have had the good fortune to produce colours which catch the female eye. Therefore, it is that benzene is famous. But I plead for her humbler sisters who have produced no colours, but the study of whom may yet be steps to the discovery of mighty laws and phenomena which may interest the world. And this, in my humble judgment, is one of the advantages of this Society, that it tends, by bringing men of different researches and pursuits and different intellectual qualifications together, to prevent the science from becoming the mere "handmaid of industry," and ensures that its higher claims shall secure recognition from its votaries. And now I must say a word about the future. Our President has prophesied great things, and is imbued with a just confidence as to the future that awaits us. I believe that there is plenty of room for discovery in the future, and that our forefathers have by no means monopolized the glory that our descendants may win. I rather feel as an outsider—looking at what science is and has achieved—that it is like an Alpine prospect in the early morning, when you see here and there a few peaks bathed in light, but separated from each other by depths and chasms of the unknown. And that is what we all of us feel who look with very little skill or very superficially at the history of science in our own days. It seems evident to me that chemistry is entering upon a new stage, in which it may win splendid victories and learn things of which our forefathers never dreamed. Perhaps it will be best to describe the difference between chemistry as it is now and as it was when I was a young man. In those days the atom reigned supreme; but now the atom has been dethroned, and the bacillus reigns in its stead. But that means that you are approaching, with more and more chance of solving, it the vast problem that separates organic and inorganic nature. Your President has claimed that Nature has no longer the monopoly of creating organic substances. That is true; but Nature does still a great many things that you cannot do. And still less can you tell me the reason of the vast difference between organic and inorganic nature. You are all of you familiar with the tremendous vegetable poisons which produce the most fearful and astounding effects upon the human frame; but if I asked you to explain their effects you would show me formulæ showing that they consisted of the most vulgar and commonplace elements, but giving no explanation of the tremendous powers they assume. I am an agriculturist, and a disciple of Dr. Gilbert and others. I compass sea and land in order to get manure to make our products grow. And what is manure? It is an impure form of the carbon and nitrogen in which those products are bathed in the circumambient air every day of their lives. I trust that the chemistry of the future may tell us why we have to go to Chili, and why we cannot take the nitrogen from the air around us. I believe that these and other problems are now approaching nearer to their solution than ever they were before, because we have seen chemistry grapple more closely with the mysteries which separate organic and inorganic life. I believe that in the future—some fifty years hence it may be—in this or some other room, the President of the Chemical Society of that day will congratulate the Associates of that Society on victories and on achievements of which we cannot now dream the nature. And I am quite sure that when he does so he will attribute no small share of that progress to the existence and labours of the Chemical Society.

Sir Lyon Playfair, in responding, said:—

I quite understand that the reason for selecting me for the honour of acknowledging the toast of "The Chemical Society," is the privilege of old age, and of my having been one of its first members. But I am sure that you will agree with me, that we owe a debt of gratitude to the noble Marquis. He has, as Prime Minister, to bear the weight and responsibility of this great Empire, and it is a proud fact that he has recognized so much the influence and the benefits of chemistry as to honour us by appearing here this evening to propose this toast. If Lord Salisbury had not unfortunately become a great statesman, and had followed the inclination of his own mind, he would have been a great chemist. The education of the upper classes in this country has for a long time been too restricted. Science has not formed that element in education which is so necessary for its progress, and I trust now that the Universities, and the various institutions throughout the country which are doing so much for the advancement of science, will produce great results in the future. But we cannot but regret that the education of the past has not given to us that amount of hereditary talent which our old families possess, and which they have generally given to the benefit of the State. It must be recollected that we have had in the past several instances of descendants of noble families becoming great men of science. We all remember that the famous Boyle was called "the father of modern chemistry, and brother of the Earl of Cork"; and he showed us in his work that we must not trust to authority, but must use acumen as a means of demonstration in all questions brought before us. It was a great delight to me to see, in the exhibition at the Goldsmiths' Hall yesterday, those interesting instruments which Boyle used in his researches. There was another member of a noble family whom we are always glad to claim as a master among chemists: I mean Cavendish, who discovered the composition of water. He did much more than that, however, for he taught us that all experiments should be made with absolute accuracy as regards weight and measure. But what am I to say in answer to this toast? It is a large and important subject. I recollect it fifty years years ago. I am glad to say that not many of you have such an antique recollection of our science as that. The changes that have taken place in the science during that time have been vast indeed. Of course, our main object is to study chemical affinity, to understand the relations of the elements, and the families into which they group. One of the results of fifty years' advance in chemistry is that you have introduced a great deal of profligacy into the elements. When I was young we always taught that oxygen was the universal lover, and joined freely with almost every body, while nitrogen was a confirmed bachelor, and could only be put into union under great difficulty. But now, how completely this is all changed. Oxygen is now a respectable bigamist, while nitrogen, which acts so meekly in the atmosphere, when it gets out of it becomes a terrible polygamist, for it takes three and sometimes even five conjugates at a time, and produces bodies of a remarkable character. I have two friends, one of whom, Hofmann, is not here, but the other, Dr. Perkin, is, and they have done very much to corrupt the morality of the nitrogen of my youth. They have not only taught us what it can do in the way of conjugates, but have shown it to be a most fickle body, from whom you may take one conjugate and readily replace it by another, and thus produce most remarkable compounds. Sometimes they carried their efforts so far that nitrogen became apparently ashamed of itself, and blushed as rosanilin or became scarlet as magenta, and even, when moved by strong emotion, became purple as mauve. Occasionally chemists have tried to get nitrogen back to good habits, to be content with more simple conjugates, and be content with fewer elements in combination. But see how it revenges itself. Curtius and Radenhausen have lately described a most extraordinary compound—azoimide—in which three atoms of nitrogen unite with one atom of hydrogen. This was most unfair, for three atoms of nitrogen ought to have at least nine atoms of hydrogen. But they compelled it to do with one, and what is the consequence? They had to make it take the form of a liquid, and when in that condition it exploded with such violence as to break every glass vessel in the laboratory, and, I am sorry to say, injure one of the persons who tried to force it into this unnatural union. I have therefore some right to complain that the respectable nitrogen of my youth has become a most profligate element under your tuition. And what shall I say of carbon? How different was the carbon of 1841 from the carbon which we now know. At that time we knew, of course, that it was combined in most organic bodies, and Liebig had determined the constitution of the bodies into which it entered, but then we did not require to puzzle ourselves with those fearful complications of diagrams and graphic methods by which we now represent the tenacity of carbon for various substances. These methods are very difficult for the pupil to follow, and I am sure that if Cullen, who invented the system of chemical diagrams, could come to life again, and see the wonderful methods by which chemical combinations are now represented, he would ask to go back to his grave again and rest. Chemical substances now have such astounding properties. If there are two bodies which I thought I knew most thoroughly they are the quiet and respectable compounds called in my old professional days carbonic oxide and carbonic acid. But the respectable quiet carbonic oxide of 1841 was shown the other day by Mond to run away with nickel in the state of a gas—a quiet stable element like nickel. And then when it was followed in hot pursuit, by raising the temperature a few degrees, it dropped the nickel like a hot potato. Well, I am speaking of the changes which strike a man looking backwards, and comparing the chemistry of his day with that of the present time. But though I have been chaffing in an after-dinner speech, do not think that I do not appreciate the vast progress that has been made in the discoveries relating to the valency of the elements. That has been the great distinguishing feature of modern chemistry. There is a great future before the chemistry of this country; and when the centenary of this Society takes place, the members will look back not without respect to the efforts we made in the first fifty years of the Society's existence. In conclusion, I must again thank Lord Salisbury for having honoured us on this occasion in the midst of his great and incessant duties, to show his appreciation of a science in which he has often laboured, and the value and importance of which he has recognized in the excellent speech before us.

THE SCIENCE MUSEUM.

THE question of the Science Museum which has been on the *tapis* for the last eighteen years, has moved —backwards—during the past week. The following question and answer will show how:—

"Sir Henry Roscoe asked the Chancellor of the Exchequer whether it was the case that an unknown donor had offered £80,000 to build an art gallery on a site at South Kensington, the erection of which would materially interfere with the purposes for which land was recently bought by Government for housing the science collections, and for the necessary erection of suitable chemical and physical laboratories in connection with the Royal School of Science; whether another site at South Kensington had been offered which would not interfere with the object for which Parliament granted the purchase-money for the land; and whether the Government would give an assurance that those objects would be maintained.

"The Chancellor of the Exchequer—It is true that a public-spirited gentleman has offered £80,000 to build an art gallery on a site at South Kensington; but with regard to the further points raised by the hon. member, I may say at once that the offer only affects about one-tenth of the land recently bought by Government, and the remainder would still be left available, if required, for science collections. No pledge was given that the whole of the land would be appropriated to science collections. On the contrary, the Treasury, in accepting the offer of the Commissioners of the 1851 Exhibition, stated that the land was in excess of even future requirements of the science collections. It would be possible to make adequate provision for chemical and physical laboratories on the land between the Imperial Institute Road and the Technical Institute. This site adjoins the east galleries, and it is in these galleries, together with the west and southern galleries, and a proposed cross gallery joining the east and west galleries, that the science collections may ultimately be housed. The interests of the Royal School of Science, and of the science collections, are being carefully kept in view, and the hon. member will understand that the acceptance of this generous offer will enable us to provide adequate space for exhibition purposes more rapidly than would have been possible under the old scheme."

It thus appears that the ground which was bought to house collections illustrating science is to be used for some other purpose, since the present collections are to be permanently located in those galleries which, rightly or wrongly, are not considered by "the unknown donor" to be good enough for his pictures.